production presents economic challenges to agroforestry. While not wishing to understate the economic challenges of viable agroforestry in such contexts, the resistance of many agroforestry communities to oil palm expansion attests to their viability [2–4]. In a worst case scenario agroforests at the margins of High Conservation Value (HCV) areas will indeed be converted to oil palm, resulting in the system espoused by Struebig *et al.* of intensive production directly abutting HCV areas. We recognise the risks (wildlife conflicts, hunting and encroachment) inherent in our approach, but argue that a strict land-sparing and/or HCV combination would be subject to similar risks. Indeed we argue that agroforestry buffers would act as social barriers to further expansion of oil palm, in that this would necessitate encroachment on agroforest land and undermine the services and resources agroforesters derive from the adjoining natural forest. Our vision is a working landscape mosaic that serves the needs of companies, local communities and conservation within areas already slated for oil palm development [5]. This stands against a purely plantation–HCV matrix which excludes people and offers only protected zones which few can access, appreciate and benefit from.

Struebig *et al.*'s penultimate paragraph betrays a misunderstanding of our concept which needs clarification. We use the 'designer' appellation deliberately to imply careful evaluation and designation of land uses according to social, economic and ecological needs, an approach that is too late for existing established plantations, but which would avoid the scenario they fear for future plantations.

The unrealistic simplicity of Struebig *et al.*'s vision is reflected by their emphasis of a forest and non-forest dichotomy, a view that fails to capture the complexity of existing land-uses in much of the tropics. In some regions this dichotomy may be appropriate, and land sparing a potentially advantageous response, but we do not believe that this will be so for very large swathes of land that encompass a variety of land use systems and livelihood interests.

References

1 Struebig, M.J. *et al.* (2010) A reality check for designer biofuel landscapes. *Trends Ecol. Evol.* 25, 7–8
2 Koczberski, G. and Curry, G.N. (2005) Making a living: land pressures and changing livelihood strategies among oil palm settlers in Papua New Guinea. *Agr. Syst.* 85, 324–339
3 Kusters, K. *et al.* (2007) Towards solutions for state vs. local community conflicts over forestland: The impact of formal recognition of user rights in Krui, Sumatra. *Indonesia. Hum. Ecol.* 35, 427–438
4 Therville, C. (2008) *Dynamics of Rubber Agroforest Conversion in Bungo District. Perception Survey and Spatial Analysis (Jambi Province, Indonesia)*. Center for International Forestry Research
5 Koh, L.P. *et al.* (2009) Designer landscapes for sustainable biofuels. *Trends Ecol. Evol.* 24, 431–438

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Book Review

No going back for species and ecosystems

Heatstroke: Nature in an Age of Global Warming by Anthony D. Barnosky. Island Press/ Shearwater Books, 2009. US$26.95 hbk (269 pages) ISBN 10: 1597261971, ISBN 13: 9781597261975

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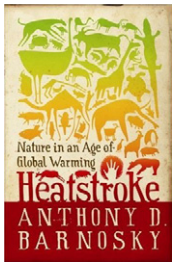

These are times both terrible and exhilarating, and for none more than conservation biologists. We are confronted by compound pressures on biodiversity worse than any seen before in human history, and our ability to respond is limited not only by a collective failure of vision, but also by economic, social and political turbulence. We are increasingly conscious of at least one window of opportunity, a coherent global response to climate change, shutting faster than we can leap through. As we know, we are the first generation able to understand the changes we have caused, but the last with the chance to influence the course of many of them [2].

Before facing these uncomfortable truths, *Heatstroke* looks deeply into 'the past's 'crystal ball' on climate change and biodiversity. Understanding the severity and speed of past changes is essential to assessing future risk. Barnosky, a Berkeley palaeoecologist, sketches how biodiversity might respond not only to climate change, but also to compound environmental change threats, which collectively present 'non-analogue' conditions to those experienced in evolutionary history. There have been 39 glacial–interglacial shifts over the past two million years. Most warming events happened over timeframes of perhaps 5000 years, rather than the past century or two of accelerated climate change, and most marked a transition between cold times and warm, rather than warm times and hot, as we face today. It will probably be hotter by 2050 than at any time previously in human history and, by 2100, than at any time in the past 3 million years. As Barnosky notes in a radio interview about the book, there is probably not a familiar species existing today which has experienced such a climate. These non-analogue conditions already appear to be taking some species outside their tolerance zones [1].

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Outside the scientific and environmental NGO communities, it can be hard to find people working on climate change who remember that humans are not the only vulnerable species, or even that ecosystems and biodiversity support human survival and livelihoods, and offer an important buffer from the worst impacts. So this lucid and thought-provoking popular account of climate change and biodiversity, past and present, is an essential contribution. Barnosky's palaeoecology work enables him to weave a deep-history tapestry of life and evolution that is infused with admiration, curiosity and respect for the many grand experiments of nature represented by biotic evolution. Indeed, his writing is elegiac in places, and his symbolism vivid, ranging from palaeozoology and sedimentology to human history, conservation biology and globalization. Climate change, compounded by all the other threats, is a 'wrecking ball breaking down in hours a building that took years to construct.'

It is easy for the uninformed to dismiss climate change impacts on biodiversity and ecosystems as 'part of a natural cycle.' Even palaeobiologists and geologists sometimes sweep aside the impending biodiversity and climate change crises in this way, as though the intense fragmentation, homogenization and pollution of the planet by 6.8 billion people matters nothing to the adaptation options of other species. Barnosky's measured approach is an important antidote. He notes the uncertainty in predicting how (and whether) ecological communities will adapt: to what extent they remain cohesive and stable in times of change, rather than random and dynamic species assemblages with individual responses. To some extent, this is a question of taxonomic scale, one of great importance for the conservation of species and evolutionarily distinct lineages. A geological timeline would have been useful to set these past changes in context for a general readership.

Our understanding of vulnerabilities to environmental change will never be sufficient until we redress the lack of data sets from southern hemisphere ecosystems, including those driven by disturbance such as fire, which is intricately bound to climate change. Barnosky dips into African and tropical ecosystems, but these have responded differently to extreme changes during the Pleistocene and earlier climate cycles, and a substantive storyline from the South remains to be written. However, it is not that the existing global information (prominently including published southern information) has not been reviewed: the 2007 IPCC Fourth Assessment Report included a significant update and review [1] of ecosystem and biodiversity vulnerabilities worldwide.

Too much of the literature has treated climate change as a vacuum-packed issue. *Heatstroke* is a reminder that the exquisite architecture of species around the world is being smashed by multiple wrecking balls simultaneously, some of which increase each others' force. Invasive alien species and habitat fragmentation are treated pretty well by Barnovsky, and their complex interactions with climate change demand greater attention from the global change community. Although it might seem too much to ask, we would have liked to see mention of ocean acidification, CO_2 fertilization effects, and impacts of a few policy curve-balls, such as biofuels expansion and other drivers arising from the Clean Development Mechanism. These are yet a new generation of unintended consequences of a collective societal failure to think integratively. One of the real pleasures of *Heatstroke* is the integrated approach that Barnosky brings to his subject. It makes one feel that we ecologists have let the side down, by failing to insist 40 years ago that such thinking inform the fundamentals of human development planning.

References

1 Fischlin, A. *et al.* (2007) Ecosystems, their properties, goods, and services. In *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Parry, M.L. *et al.*, eds), pp. 211–272, Cambridge University Press

2 Vitousek, P.M. *et al.* (1997) Human domination of Earth's ecosystems. *Science* 277, 494–499

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Book Review

The fieldworkers' wild truths

The Infanticide Controversy: Primatology and the Art of Field Science by Amanda Rees. University of Chicago Press, 2009. US$40.00 hbk (288 pages) ISBN: 9 780 22670711 2

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Exchanging pointed and often nasty arguments (however silly in hindsight) invigorates the participants of academic debates and entertains bystanders. *The Infanticide Controversy* reconstructs the history of a particularly vicious and drawn-out brawl [1,2]. One faction, the adaptionists, maintains that the killing of immature animals by conspecifics is targeted and follows regular patterns reflecting underlying principles, such as resource competition, cannibalism or intra-sexual selection between males. For the non-adaptionist faction, infant killings are, at best, a pathology or sad mistake, but more probably products of the imagination of sloppy scientists tainted by Zeitgeist demons such individualism or capitalism.

I longed for a juicy helping of controversy about the controversy. Instead, *The Infanticide Controversy* served an overdose of impartiality. This probably indicates the

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